

REMARKS

The Examiner is thanked for his courtesy during a telephone interview on 18 March 2004. At least a portion of the following remarks summarize this interview. Claims 1, 11, 18, and 34 been amended. The amendments are supported in the specification on page 23, lines 8-11, among other places. Claims 1-47 remain pending.

The Examiner rejected claims 1, 3-9, 18, 19, 22-25, 27-30, 34, 37-39, and 41-44 under 35 U.S.C. §103(a) as being unpatentable over Forslund (U.S. patent 5,659,630) in view of Panofsky (U.S. patent 4,445,137). The Examiner has also rejected claim 10 under 35 U.S.C. §103(a) as being unpatentable over Forslund and Panofsky in view of Garza et al. (US 6,081,659). Claims 11-17 are rejected under 35 U.S.C. §103(a) as being unpatentable over Forslund and Panofsky in view of Pial et al. (US 5,357,632). Additionally, claims 20 and 35 are rejected under 35 U.S.C. §103(a) as being unpatentable over Forslund, Panofsky, and Kober (4,181,936). Claims 21, 26, 36, and 40 are rejected under 35 U.S.C. §103(a) as being unpatentable over Forslund, Panofsky, and Schmuter (4,999,785). Claims 31-33 and 45-47 are rejected under 35 U.S.C. §103(a) as being unpatentable over Forslund, Panofsky, and McCubbrey (4,484,394). The Examiner's rejections are respectfully traversed as follows.

Claim 1 is generally directed towards an "apparatus for analyzing a plurality of image portions of at least a region of a sample." Claim 1 also requires "a plurality of processors arranged to receive and analyze at least one of the image portions" where "the processors [are] arranged to operate in parallel and [are] configurable to implement one or more algorithms from a plurality of different algorithms for analyzing the image portions selected to determine whether the corresponding regions of the sample are defective." Claim 1 also requires "a data distribution system arranged to receive image data, select at least a first processor for receiving a first image portion and not a second image portion of the image data and one or more first algorithms selected from the plurality of different algorithms, select at least a second processor for receiving the second image portion and not the first image portion of the image data and one or more second algorithms selected from the plurality of different algorithms, output the first image portion to the first processor and the second image portion to the second selected processor, and configure the first processor with the one or more first algorithms and the second processor with the one or more selected algorithms."

Independent claim 11 is directed towards an "apparatus for inspecting a plurality of image portions of at least a region of a sample." Claim 11 requires "a plurality of distributors arranged to receive the image portions" and "a plurality of processors that are arranged into a plurality of subgroups that are each coupled to an associated distributor." Claim 11 also require

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that "each processor [is] configurable to implement one or more algorithms selected from a plurality of different algorithms for analyzing the image portions to determine whether the corresponding regions of the sample are defective, each distributor [is] configurable to select one or more algorithms selected from the plurality of different algorithms, output selected image portions to its associated subgroup of processors whereby a different set of one or more image portions is output to each associated processor, and configure its associated processor with its selected one or more algorithms, at least two of the processors [are] arranged to analyze at least two of the image portions in parallel."

Independent claim 18 is directed towards a method and requires "receiving data derived from the inspection in a multiprocessor system" and "the system comprising a master processor and a plurality of slave processors". Claim 18 also recites "dividing the data into groups using the master processor and sending a different data group to each one of the slave processors... wherein each slave processor is configurable to implement one or more algorithms selected from a plurality of different algorithms for analyzing a one of the data groups to determine whether the corresponding portions of the sample are defective." Claim 24 is also a method claim and requires "outputting each image portion to a selected processor, at least some of the image portions going to different processors" where "each being configurable to implement one or more algorithms selected from a plurality of different algorithms for analyzing the image portions to determine whether the corresponding portions of the sample are defective." Claim 24 also requires "selecting one or more algorithms from the different algorithms of each selected processor and configuring each selected processor with its selected one or more algorithms." Claim 24 also requires "analyzing each image portion for defects within the selected processor based on the selected one or more algorithms for such selected processor." Claims 34 and 39 are directed towards computer readable medium and have limitations similar to method claims 18 and 24, respectively.

In general, apparatus and/or methods are provided for dividing the image data into image portions or patches which can then be each processed in parallel by different processors which are configurable with different algorithms for determining defects. Embodiments of the present invention allow parallel inspection analysis of different image portions for determination of defects. This parallel inspection processing is inherently faster than conventional serial inspection systems.

Although the primary reference Forslund discloses parallel circuits for processing image data to determine defects, Forslund fails to disclose apparatus or methods for dividing the image data among different processors which are configurable to use different algorithms to determine defects in the manner claimed. In contrast, the entire set of image data is fed to each of the

processing circuits or channels which determine defects. See Column 5, Line 66 through Column 6, Line 24 and Fig. 5.

It is noted that Forslund does refer to parallel processing of image portions in Column 7, Line 40 through Column 7, Line 25. However, it is respectfully that this section pertains to a process for preparing the image data prior to inputting it to the inspection analysis channels. In the Description of the Invention section, Forslund begins by generally describing the components of the system of Figure 5. Design data is processed by processor 61 to produce a rasterized reference image at the appropriate inspection resolution. The rasterized full image is then fed to the processing channels which determine defects via the registration subsystem 66. Forslund then generally discusses handling of the image from the inspection camera 64, wherein the rasterized image data stream is fed through segmentation circuitry 65 to produce a thresholded image data stream. This thresholded image data stream is then processed by registration and analysis channels which determine defects. See Column 5, Line 61 through Column 6, Line 11.

After this general discussion, Forslund goes on to describe each portion of Figure 5 in detail. The first detailed section of Column 6, line 40 through Column 7, Line 25 describes the segmentation processing of the image data stream for producing a thresholded image. In particular in this section, Forslund refers U.S. patent 4,174,514 (the '514 patent) for an example of segmentation processing. Segmentation is a process that operates on a first image matrix to generate a second matrix wherein each element has a value dependent upon the value of its equivalent element in the first matrix and the value of its neighboring elements in the first matrix. This process is useful for conditioning the image data so as to enhance the image for pattern recognition. In other words, segmentation can be used to prepare the image for later analysis by the inspection algorithms or processors. Segmentation is generally defined in Column 1, Lines 19-25 of the '514 patent. This type of process is also described in this Forslund section. Forslund then goes on to step through the other components of Figure 5 in detail, e.g., the registration system and then the channels in Columns 7 and 8.

It is respectfully submitted that dividing the image for segmentation processing is very different than dividing the image for inspection processing to determine defects. For inspection processing, image portions which are designed to be identical are compared to each other to determine whether there is a defect. Thus, the image portions routed to a particular processor need to encompass areas that can be compared to each other. In contrast, segmentation can be performed on any image portion.

In sum, Forslund fails to teach or suggest apparatus or methods for dividing the image data among different processors which are configurable to use different algorithms to determine

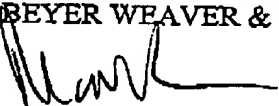
defects in the manner claimed. The secondary reference Panofsky also fails to teach such features.

For the forgoing reasons, it is submitted that claims 1, 11, 18, 24, 34, and 39 are patentable over the cited references.

The Examiner's rejections of the dependent claims are also respectfully traversed. However, to expedite prosecution, all of these claims will not be argued separately. Claims 2-10, 12-17, 19-23, 25-33, 35-38, and 40-47 each depend directly from independent claims 1, 11, 18, 24, 34, or 39 and, therefore, are respectfully submitted to be patentable over cited art for at least the reasons set forth above with respect to claims 1, 11, 18, 24, 34, and 39. Further, the dependent claims require additional elements that when considered in context of the claimed inventions further patentably distinguish the invention from the cited art.

Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
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